

1997 Chevrolet S10 Pickup

ENGINE COOLING FAN 1997 ENGINE COOLING General Motors Corp. - Electric Cooling Fan

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DESCRIPTION

All FWD and some RWD vehicles use an electric cooling fan. The electric cooling fan is used for radiator and A/C condenser cooling. Cooling fan operates when A/C is on and when engine coolant temperature exceeds a specific value. One or more cooling fan relays may be used.

TROUBLE SHOOTING

PRELIMINARY INFORMATION

This article contains only the text required to test electric cooling fans. Other diagnostic information may be referenced while performing electric cooling fan diagnosis. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section for complete information on engine control systems.

Some truck models are equipped with an auxiliary electric cooling fan. The auxiliary electric cooling fan is not controlled by Powertrain Control Module (PCM).

Trouble shoot cooling fan using appropriate diagnostic information provided. For cooling fan relay location, see **COOLING FAN RELAY LOCATION** table.

COOLING FAN RELAY LOCATION

Application	Location
"C" & "K" Series	⁽¹⁾ In Engine Compartment Fuse/Relay Block, Near Anti-Lock Brake Control Module
"P" Series	
Diesel	Under Battery Junction Block, On Engine Bulkhead Relay Bracket
Gasoline	At Main Support Bracket, Behind Steering Column
"U" Series	Inside Electrical Center, At Right Front Of Engine Compartment
(1) See <u>Fig. 1</u> .	

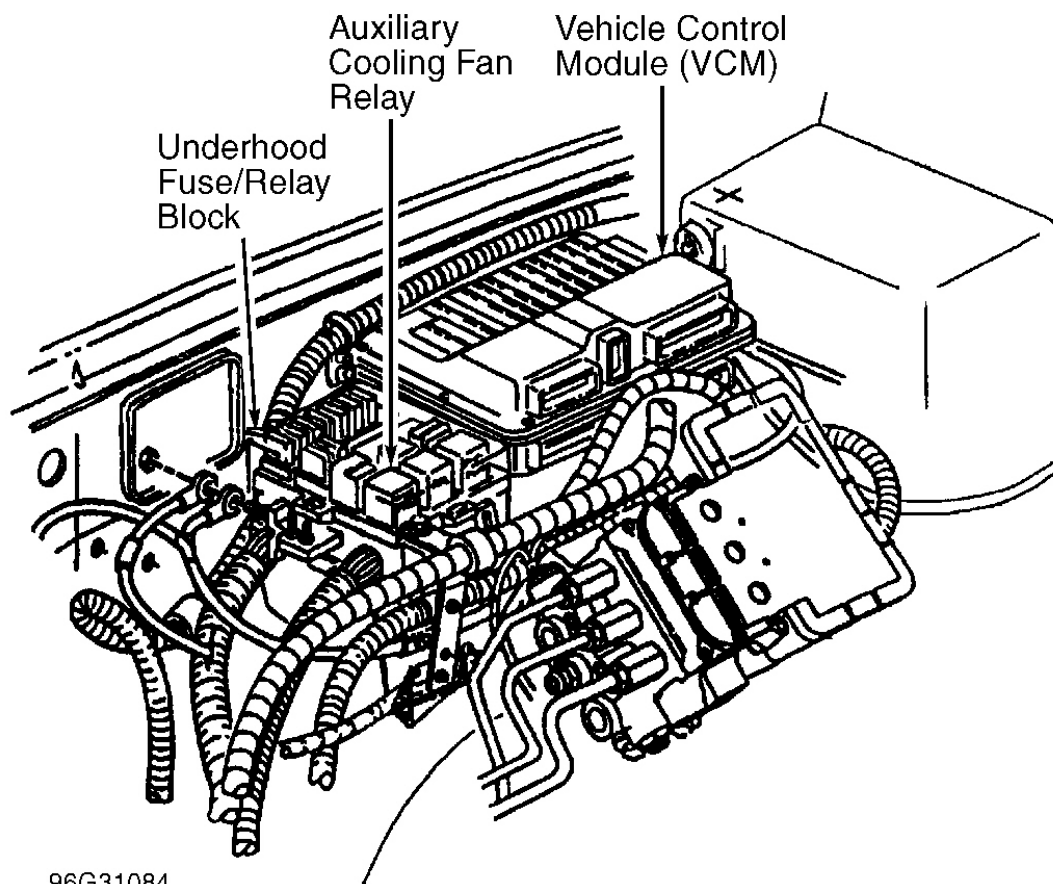
To help save diagnostic time, ALWAYS check for blown fuses or fusible links before proceeding with any testing. If fuses are blown, locate and repair short circuit before replacing fuses. Ensure all related relay and wire harness connections are clean and tight. Repair as necessary. See **WIRING DIAGRAMS** for component, terminal and wire color identification.

WARNING: Vehicles may be equipped with a PCM/VCM using an Electronically

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Erasable Programmable Read Only Memory (EEPROM). When replacing PCM/VCM, the new PCM/VCM must be programmed.



96G31084

Fig. 1: Auxiliary Cooling Fan Relay Location ("C" & "K" Series)
Courtesy of GENERAL MOTORS CORP.

SCAN TOOL

A variety of information is transmitted through Data Link Connector (DLC). This data is transmitted at a high frequency which requires the use of Tech 1 Scan Tool (94-00101A), appropriate cartridge kit and vehicle interface module kit. Other types of scan tools are available and may function and provide adequate information for diagnostic work. Always refer to scan tool manufacturer's instructions.

ELECTRIC COOLING FAN CIRCUIT DIAGNOSIS

3.4L ("U" SERIES)

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NOTE: Cooling fan circuit utilizes 3 cooling fan relays. Relays directly controlling fan motors are 4-pin type and are referred to as No. 1 and No. 2. Relay determining cooling fan motor low speed or high speed operation is referred to as 5-pin relay in this test. See WIRING DIAGRAMS .

Description

Power for cooling fan motors is supplied through COOL FAN 1 Maxi-fuse (30-amp) and COOL FAN 2 Maxi-fuse (30-amp) in underhood electrical center. Cooling fan relays are energized when current flows from Maxi-fuses through relay coils, then to ground through Powertrain Control Module (PCM). No. 1 cooling fan relay control circuit is grounded for low speed operation. Both fan control circuits and all 3 relays are grounded for high speed fan operation.

During low speed cooling fan operation, PCM supplies a ground path for No. 1 cooling fan relay. As a result, relay contacts close, allowing current to flow from COOL FAN 1 Maxi-fuse through relay coil to cooling fan No. 1 (left side). During low speed cooling fan operation, ground path for cooling fan No. 1 is through cooling fan relay (5-pin) and cooling fan motor No. 2 (right side). This results in a series circuit with both fans operating at low speed.

During high speed cooling fan operation, PCM supplies 2 ground paths for all 3 cooling fan relays. As a result, relay contacts close in all relays, allowing both cooling fan motors to operate at high speed. Both cooling fans are supplied current from both COOL FAN Maxi-fuses. Each cooling fan motor has a separate ground path when operating in high speed mode.

Cooling Fan Circuit Diagnosis

1. If Powertrain On-Board Diagnostic (OBD) System Check has not been performed, see appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. If OBD SYSTEM CHECK has been performed, go to next step.
2. Check for PCM Diagnostic Trouble Codes (DTCs). If any DTCs are present, perform testing for applicable DTC. Repair all DTCs that are set before proceeding with testing. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. If no DTCs are present, go to next step.
3. Ensure engine coolant temperature is less than 212°F (100°C). Turn A/C off. Turn ignition on. If cooling fans go off, go to next step. If cooling fans do not go off, go to step 32).
4. Using scan tool, select RELAY CONTROL function. Command low speed fans on. If cooling fans operate at low speed, go to next step. If cooling fans do not operate as specified, go to step 8).
5. Command high speed fans on. Wait 6 seconds. If cooling fans operate at high speed, go to next step. If cooling fans do not operate as specified, go to step 58).

NOTE: Ensure ambient temperature is greater than 48°F (9°C) before proceeding.

6. Exit scan tool OUTPUT TESTS. Start engine. Turn A/C on. If cooling fans come on, go to DIAGNOSTIC AIDS . If cooling fans do not come on, go to next step.
7. Using scan tool, view A/C REQUEST display. If YES is displayed, go to step 77). If YES is not displayed, go to appropriate A/C CLUTCH CIRCUIT DIAGNOSIS TEST in A/C COMPRESSOR

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CLUTCH CONTROLS article.

8. If either cooling fan is running, go to next step. If neither cooling fan runs, go to step 16).
9. If cooling fan No. 1 runs, go to next step. If cooling fan No. 1 does not run, go to step 14).
10. Turn ignition off. Disconnect cooling fan No. 2 harness connector. Turn ignition on. Using scan tool, select RELAY CONTROL function. Command low speed fans on. If cooling fan No. 1 runs, go to next step. If cooling fan No. 1 does not run, go to step 80).
11. Remove cooling fan relay (5-pin) from underhood electrical center. If cooling fan No. 1 runs, go to next step. If cooling fan No. 1 does not run, go to step 13).
12. Locate and repair short to ground in circuit No. 532 (Gray wire). After repairs, go to step 81).
13. Check circuit No. 409, and/or circuit No. 473 for a short to ground. Repair as necessary and go to step 81). If no problem was found, go to step 70).
14. Turn ignition off. Disconnect cooling fan No. 1 harness connector. Turn ignition on. Using scan tool, select RELAY CONTROL function. Command low speed fans on. If cooling fan No. 2 runs, go to next step. If cooling fan No. 2 does not run, go to step 71).
15. Replace cooling fan No. 1 diode. After replacing cooling fan diode, go to step 81).
16. Turn ignition on. Remove No. 1 cooling fan relay from underhood electrical center. Using a test light connected to ground, probe No. 1 cooling fan relay cavity No. 87. If test light illuminates, go to step 18). If test light does not illuminate, go to next step.
17. Check for blown Maxi-fuse that supplies power to No. 1 cooling fan relay. If fuse is blown, locate and repair short circuit. Possible causes for short circuit are:
 - Seized cooling fan motors.
 - Shorted cooling fan motor windings.
 - Short to ground in circuit No. 504.
 - Short to ground in power feed circuit between fuse and No. 1 cooling fan relay.

If fuse is not blown, check for an open in power feed circuit between fuse and No. 1 cooling fan relay. Repair as necessary. After repairs, go to step 81).

18. Using a test light connected to ground, probe No. 1 cooling fan relay cavity No. 86. If test light illuminates, go to step 20). If test light does not illuminate, go to next step.
19. Check for blown Maxi-fuse that supplies power to No. 1 cooling fan relay. If fuse is blown, locate and repair short circuit. Possible causes for short circuit are:
 - Seized cooling fan motors.
 - Shorted cooling fan motor windings.
 - Short to ground in circuit No. 504.
 - Shorted relay coil in cooling fan relay.
 - Short to ground in power feed circuit between fuse and No. 1 cooling fan relay.

If fuse is not blown, check for an open in power feed circuit between fuse and No. 1 cooling fan relay. Repair as necessary. After repairs, go to step 81).

20. Turn ignition off. Disconnect both cooling fan harness connectors. Using fused jumper wires, jumper

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terminals "A" and "B" together at both harness connectors. Turn ignition on. Connect a test light between No. 1 cooling fan relay cavities No. 30 and 87. If test light illuminates, go to next step. If test light does not illuminate, go to step 27).

21. Connect a test light between No. 1 cooling fan relay cavities No. 85 and 86. Turn ignition on. Using scan tool, select RELAY CONTROL function. Command low speed fans on. If test light illuminates, go to next step. If test light does not illuminate, go to step 25).
22. Turn ignition off. Remove jumper wires and reconnect cooling fan harness connectors. Connect a fused jumper wire between No. 1 cooling fan relay cavities No. 30 and 87. Turn ignition on. If both cooling fans run, go to next step. If not, go to step 24).
23. Check for poor connections at No. 1 cooling fan relay in underhood electrical center. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 37).
24. Check for poor connections at both cooling fan motors. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 63).
25. Turn ignition off. Disconnect PCM harness connector C1. Install a fused jumper wire between No. 1 cooling fan relay cavities No. 85 and 86. Turn ignition on. Using a test light connected to ground, probe PCM harness connector C1, terminal No. 32 (Dark Green wire). If test light illuminates, go to step 77). If test light does not illuminate, go to next step.
26. Locate and repair open in circuit No. 335 (Dark Green wire) between No. 1 cooling fan relay and PCM harness connector C1, terminal No. 32. After repairs, go to step 81).
27. Turn ignition off. Remove jumper wires and reconnect cooling fan harness connectors. Connect a fused jumper wire between No. 1 cooling fan relay cavities No. 30 and 87. Remove cooling fan relay (5-pin) from underhood electrical center. Using a test light connected to ground, probe cooling fan relay (5-pin) cavity No. 30. If test light illuminates, go to next step. If test light does not illuminate, go to step 31).
28. Connect a test light between cooling fan relay (5-pin) cavities No. 30 and 87A. If test light illuminates, go to step 30). If test light does not illuminate, go to next step.
29. Check for open in circuit No. 409 between cooling fan relay (5-pin) cavity No. 87A and harness connector terminal "B" at cooling fan motor No. 2. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 57).
30. Check for poor connections at cooling fan relay (5-pin) cavities No. 30 and 87A in underhood electrical center. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 76).
31. Check for an open in circuit No. 504 between No. 1 cooling fan relay cavity No. 30 and harness connector terminal "B" at cooling fan motor No. 1. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 56).
32. Using scan tool, view A/C REQUEST. If YES is displayed, go to appropriate A/C CLUTCH CIRCUIT DIAGNOSIS TEST in A/C COMPRESSOR CLUTCH CONTROLS article. If YES is not displayed, go to next step.
33. If both cooling fans are operating at low speed, go to next step. If both cooling fans do not operate at low speed, go to step 40).
34. Remove No. 1 cooling fan relay from underhood electrical center. If both cooling fans run, go to next step. If both cooling fans do not run, go to step 36).
35. Locate and repair short to power in circuit No. 504 (White wire). After repairs, go to step 81).
36. Using a test light connected to battery positive, probe No. 1 cooling fan relay cavity No. 85. If test light illuminates, go to step 38). If test light does not illuminate, go to next step.

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37. Replace No. 1 cooling fan relay. After replacing cooling fan relay, go to step 81).
38. Turn ignition off. Disconnect PCM harness connector C1. Using a test light connected to battery positive, probe No. 1 cooling fan relay cavity No. 85. If test light come on, go to next step. If test light does not illuminate, go to step 77).
39. Locate and repair short to ground in circuit No. 335 (Dark Green wire) between No. 1 cooling fan relay and PCM harness connector C1, terminal No. 32. After repairs, go to step 81).
40. If both cooling fans operate at high speed, go to next step. If both cooling fans do not operate at high speed, go to step 42).
41. Using scan tool, view A/C PRESSURE on display. If reading is less than 1.2 volts, go to step 77). If reading is 1.2 volts or greater, go to step 44).
42. Turn ignition off. Disconnect PCM harness connector C1. Turn ignition on. If cooling fan No. 2 operates at high speed, go to next step. If cooling fan No. 2 does not operate at high speed, go to step 77).
43. Check for a short to ground in circuit No. 473 to cooling fan relay (5-pin) and relay No. 2 control circuit (Dark Blue wire). Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 52).
44. Turn ignition off. Disconnect A/C pressure sensor harness connector. Turn ignition on. Using scan tool, view A/C PRESSURE on display. If reading is near zero volts, go to step 46). If reading is not as specified, go to next step.
45. Using a voltmeter, check voltage between A/C pressure sensor signal and ground circuits. If reading is near zero volts, go to step 77). If reading is not as specified, go to step 51).
46. Using a test light connected to battery positive, probe A/C pressure sensor ground circuit. If test light illuminates, go to next step. If test light does not illuminate, go to step 49).
47. Using a voltmeter, check voltage between A/C pressure sensor 5-volt reference and sensor ground. If reading is near 5 volts, go to next step. If reading is not as specified, go to step 50).
48. Replace A/C pressure sensor. After replacing pressure sensor, go to step 81).
49. Locate and repair open or short to power in A/C pressure sensor ground circuit. After repairs, go to step 81).
50. Locate and repair open or short to ground in A/C pressure sensor 5-volt reference circuit. After repairs, go to step 81).
51. Locate and repair short to power in A/C pressure sensor signal circuit. After repairs, go to step 81).
52. Remove No. 2 cooling fan relay from underhood electrical center. If cooling fan No. 2 operates at high speed, go to next step. If cooling fan No. 2 does not operate at high speed, go to step 70).
53. Remove cooling fan relay (5-pin) from underhood electrical center. If cooling fan No. 2 operates at high speed, go to next step. If cooling fan No. 2 does not operate at high speed, go to step 55).
54. Locate and repair short to power in circuit No. 409 (Light Blue wire) between No. 2 cooling fan relay and cooling fan motor No. 2. After repairs, go to step 81).
55. Locate and repair short to power in circuit No. 532 (Dark Blue wire) between cooling fan relay (5-pin) and cooling fan motor No. 1. After repairs, go to step 81).
56. Check for an open in circuit No. 532 (Dark Blue wire) between cooling fan relay (5-pin) cavity No. 30 and terminal "A" of cooling fan motor No. 1 harness connector. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 79).
57. Check for an open in circuit No. 1050 (Black wire) between cooling fan motor No. 2 harness connector

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terminal "A" and ground. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 80).

58. Turn ignition on. Remove No. 2 cooling fan relay from underhood electrical center. Connect a test light between No. 2 cooling fan relay cavity No. 86 and battery positive. Using scan tool, select RELAY CONTROL function. Command high speed fans on. Wait 6 seconds. If test light illuminates, go to step 61). If test light does not illuminate, go to next step.
59. Remove cooling fan relay (5-pin) from underhood electrical center. Connect a test light between cooling fan relay (5-pin) cavity No. 86 and battery positive. Using scan tool, select RELAY CONTROL function. Command high speed fans on. Wait 6 seconds. If test light illuminates, go to step 78). If test light does not illuminate, go to next step.
60. Turn ignition off. Disconnect PCM harness connector C1. Check circuit No. 473 (Dark Blue wire) for an open or short to power. Repair as necessary. After repairs, go to step 81). If no problem is found, go to step 77).
61. Turn ignition off. Reinstall No. 2 cooling fan relay. Disconnect both cooling fan motor harness connectors. Turn ignition on. Using scan tool, select RELAY CONTROL function. Command high speed fans on. Wait 6 seconds. Using a test light connected to ground, probe terminal "B" of cooling fan motor No. 2 harness connector. If test light illuminates, go to next step. If test light does not illuminate, go to step 64).
62. Using a test light connected to battery positive, probe terminal "A" of cooling fan motor No. 1 harness connector. If test light illuminates, go to next step. If test light does not illuminate, go to step 71).
63. Check for a seized cooling fan motor or open motor winding. Replace appropriate cooling fan motor. After replacing motor, go to step 81).
64. Turn ignition off. Remove No. 2 cooling fan relay from underhood electrical center. Turn ignition on. Using a test light connected to ground, probe No. 2 cooling fan relay cavity No. 85. If test light illuminates, go to step 66). If test light does not illuminate, go to next step.
65. Locate and repair open in battery voltage circuit to No. 2 cooling fan relay. Check for blown Maxi-fuse (30-amp). Repair short to ground if blown. Replace fuse. After replacing fuse, go to step 81).
66. Using a test light connected to ground, probe No. 2 cooling fan relay cavity No. 30. If test light illuminates, go to step 68). If test light does not illuminate, go to next step.
67. Locate and repair open in battery voltage circuit to No. 2 cooling fan relay cavity No. 30. After repairs, go to step 81).
68. Check for open in circuit No. 409 (Light Blue wire) between cooling fan motor No. 2 harness connector terminal "B" and No. 2 cooling fan relay cavity No. 87. Repair as necessary. After repairs, go to step 81). If no problem was found, go to next step.
69. Check for poor connections at No. 2 cooling fan relay in underhood electrical center. Repair as necessary. After repairs, go to step 81). If no problem was found, go to next step.
70. Replace No. 2 cooling fan relay. After replacing cooling fan relay, go to step 81).
71. Turn ignition off. Remove cooling fan relay (5-pin) from underhood electrical center. Turn ignition on. Using a test light connected to ground, probe cooling fan relay (5-pin) cavity No. 85. If test light illuminates, go to step 73). If test light does not illuminate, go to next step.
72. Locate and repair open in battery voltage circuit to cooling fan relay (5-pin) cavity No. 85. After repairs, go to step 81).
73. Using a test light connected to battery positive, probe cooling fan relay (5-pin) cavity No. 87. If test light

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illuminates, go to step 75). If test light does not illuminate, go to next step.

74. Locate and repair open in circuit No. 1050 (Black wire) between cooling fan relay (5-pin) cavity No. 87 and ground. After repairs, go to step 81).
75. Check for poor connections at cooling fan relay (5-pin) in underhood electrical center. Repair as necessary. After repairs, go to step 81). If no problem was found, go to step 76).
76. Replace cooling fan relay (5-pin). After replacing cooling fan relay, go to step 81).
77. Replace PCM. After replacing PCM, go to step 81).
78. Repair open in circuit No. 473 (Dark Blue wire) between PCM harness connector C1, terminal No. 31 and cooling fan relays (5-pin and No. 2) cavity No. 86. After repairs, go to step 81).
79. Replace cooling fan motor No. 1. After replacing cooling fan motor, go to step 81).
80. Replace cooling fan motor No. 2. After replacing motor, go to next step.
81. Ensure coolant temperature is less than 212°F (100°C). Turn A/C off. Start engine and let idle. If cooling fans are running, go to step 32). If cooling fans are not running, go to next step.
82. Using scan tool, select RELAY CONTROL function. Command low speed fans on. If both cooling fans operate at low speed, go to next step. If both cooling fans do not operate at low speed, go to step 8).
83. Command high speed cooling fans on. Wait 6 seconds. If both cooling fans operate at high speed, system is okay at this time. If both cooling fans do not operate at high speed, go to step 58).

Diagnostic Aids

Check for poor connections at PCM, cooling fan relays and cooling fan motors. Inspect harness connectors for damaged, corroded or backed-out terminal pins. Inspect related wiring harnesses for damage or improper routing.

4.3L, 5.0L, 5.7L & 7.4L ("C" & "K" SERIES)

Description

Auxiliary cooling fan is controlled by VCM based on various inputs. Battery voltage is supplied to the auxiliary cooling fan relay. If ignition voltage is supplied to auxiliary fan relay (coil side). VCM controls cooling fan by relay by providing a ground path.

NOTE: Check VCM Diagnostic Trouble Codes (DTCs) that may affect system. If any DTCs are present, perform testing for applicable DTC. Some DTCs may cause auxiliary cooling fan to stay on at all times. Repair all DTCs that are set before proceeding with testing. See appropriate ENGINE PERFORMANCE article.

Cooling Fan Circuit Diagnosis

1. Perform Powertrain On-Board Diagnostic (OBD) System Check. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. After performing OBM system check, go to next step.
2. Turn ignition on. Using scan tool, check if any Diagnostic Trouble Codes (DTCs) are present. If DTCs are present, perform testing for applicable DTC. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. If no DTCs are present, go to next step.

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3. Ensure engine coolant temperature is less than 212°F (100°C) when diagnosing cooling fan system. Turn ignition on, with engine off. If cooling fan is off, go to next step. If cooling fan is on, go to step 5).
4. Using scan tool, command cooling fan relay on, then off. If cooling fan turns on and off with each command, system is okay. See **DIAGNOSTIC AIDS** . If cooling fan does not turn on and off with each command, go to step 6).
5. Disconnect cooling fan relay. If cooling fan stops, go to step 10). If cooling fan does not stop, go to step 16).
6. Turn ignition off. Disconnect cooling fan relay. Turn ignition on. Using a test light connected to ground, probe battery feed circuits at relay harness connector terminals. If test light illuminates on both circuits, go to next step. If not, go to step 19).
7. Connect test light between battery feed circuit and auxiliary fan relay circuit at relay harness connector. Using scan tool, command fan on and then off. If test light turn on and off with each command, go to next step. If not, go to step 11).
8. Turn ignition off. Reconnect cooling fan relay. Disconnect VCM harness connector containing the relay control circuit. Turn ignition on. Using DVOM on 10-amp. scale, check current draw on relay control circuit from VCM harness connector to ground. If current draw is less than 0.75 amp within 2 minutes, go to step 22). If not, go to step 11).
9. Disconnect cooling fan harness connector. Connect test light across cooling fan harness connector terminals. If test light illuminates, go to step 16). If test light does not illuminate, go to next step.
10. Turn ignition off. Disconnect VCM harness connector. Using DVOM, check resistance between ground and cooling fan relay control circuit at VCM harness connector. If resistance is infinite, go to step 24). If not, go to step 20).
11. Connect a fused jumper wire between battery feed circuit and circuit leading to cooling fan motor. If cooling fan operates, go to next step. If not, go to step 15).
12. Turn ignition off. Reconnect cooling fan relay. Disconnect VCM harness connector containing the fan relay control circuit. Turn ignition on. Connect a fused jumper wire to ground and probe fan relay control circuit terminal at VCM harness connector. If relay operates, go to step 14). If not, go to next step.
13. Check connections at cooling fan relay connector. Repair as necessary. If connections are okay, go to next step.
14. Check connections at VCM harness connector. Repair as necessary. If connections are okay, go to step 21).
15. Check connections at cooling fan harness connector. Repair as necessary. If connections are okay, go to step 17).
16. Repair short to voltage in power feed circuit between cooling fan relay and fan motor.
17. Check for open in power feed circuit between cooling fan relay and cooling fan motor. Repair as necessary. If circuit is okay, go to next step.
18. Check for open in cooling fan motor ground circuit. Repair as necessary. If circuit is okay, go to step 23).
19. Repair open in battery feed circuit that did not illuminate test light.
20. Check for short to ground in relay control circuit. Repair as necessary. If circuit is okay, go to step 22).
21. Check for open in cooling fan relay control circuit. Repair as necessary. If circuit is okay, go to next step.
22. Replace auxiliary cooling fan relay. If cooling fan still does not operate, go to step 24).
23. Replace auxiliary cooling fan motor.

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24. Replace VCM. Program replacement VCM using required equipment.

Diagnostic Aids

Whenever owner complains of an overheating problem, determine if complaint was due to an actual boilover, or TEMP light or gauge indicated overheating. Whenever gauge or light indicates overheating, but no boilover is detected, gauge or light circuit should be checked. Gauge accuracy can also be checked by comparing engine coolant temperature sensor reading with gauge reading.

If engine is actually overheating, and gauge indicates overheating, but cooling fan is not coming on, ECT sensor has probably shifted out of calibration and should be replaced. Whenever engine is overheating, and cooling fan is on, cooling system should be checked.

6.5L - VIN F DIESEL ("P" SERIES W/O AUX FAN CONTROL SWITCH)

Description

With ignition switch in ON position, ENG 1 fuse (20-amp) located in instrument panel fuse block, supplies voltage to coil side of auxiliary cooling fan relay. During A/C compressor operation, A/C high pressure switch closes. This supplies a ground path for cooling fan relay. As a result, relay contacts close, allowing current to flow to cooling fan motor through relay, resulting in auxiliary cooling fan motor operation.

NOTE: **A fully charged A/C system is required for proper auxiliary cooling fan operation.**

Cooling Fan Circuit Diagnosis

1. If cooling fan does not run, go to next step. If cooling fan runs continuously, go to step 10).
2. Turn ignition off. Remove cooling fan relay. Turn ignition on. Using a test light connected to ground, probe cooling fan relay harness connector terminal No. 30. If test light illuminates, go to next step. If test light does not illuminate, locate and repair open in Red wire between fusible link at battery junction block and cooling fan relay.
3. Using a fused jumper wire, jumper cooling fan relay harness connector terminals No. 30 and 87. If cooling fan motor does not run, go to next step. If cooling fan motor runs, go to step 6).
4. Disconnect cooling fan motor harness connector. Using a test light connected to ground, probe cooling fan motor harness connector terminal "A". If test light illuminates, go to next step. If test light does not illuminate, Locate and repair open in Red wire between cooling fan relay and cooling fan motor.
5. Turn ignition off. Using an ohmmeter, check resistance between cooling fan motor harness connector terminal "B" and ground. If resistance is greater than 5 ohms, locate and repair open or poor connection between cooling fan motor and ground. If resistance is not as specified, replace cooling fan motor.
6. Turn ignition on. Using a test light connected to ground, probe cooling fan relay harness connector terminal No. 85. If test light illuminates, go to next step. If test light does not illuminate, locate and repair open in Pink wire between ENG 1 fuse and cooling fan relay.
7. Turn ignition off. Disconnect A/C high pressure switch. Using an ohmmeter, check resistance between A/C high pressure switch harness connector terminal "A" and cooling fan relay harness connector

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terminal No. 86. If resistance is less than 5 ohms, go to next step. If resistance is not less than 5 ohms, locate and repair open in Dark Green wire between cooling fan relay and A/C high pressure switch.

8. Check resistance between A/C high pressure switch harness connector terminal "B" and ground. If resistance is less than 5 ohms, go to next step. If resistance is not less than 5 ohms, locate and repair open in Black wire between A/C high pressure switch and splice.
9. Reconnect cooling fan relay. Turn ignition on. Using a fused jumper wire, jumper A/C high pressure switch harness connector terminal "A" to ground. If cooling fan motor runs, replace A/C high pressure switch. If cooling fan motor does not run, replace cooling fan relay.
10. Turn ignition on. Disconnect cooling fan relay from harness connector. If cooling fan motor stops, go to next step. If cooling fan motor continues to operate, locate and repair short to power between cooling fan relay and cooling fan motor.
11. Turn ignition off. Disconnect A/C high pressure switch harness connector. Using an ohmmeter, check resistance between A/C high pressure switch harness connector terminal "A" and ground. If resistance is greater than 5 ohms, go to next step. If not, locate and repair short to ground in Dark Green wire between cooling fan relay and A/C high pressure switch.
12. Reconnect A/C high pressure switch harness connector. Turn ignition on. Using a test light connected to ground, probe cooling fan relay harness connector terminal No. 86. If test light illuminates, replace A/C high pressure switch. If test light does not illuminate, replace cooling fan relay.

6.5L - VIN F DIESEL ("P" SERIES W/AUX FAN CONTROL SWITCH) & 7.4L - VIN J DIESEL ("P" SERIES W/O AUX FAN CONTROL SWITCH)

Description

On models not equipped with Vehicle Control Module (VCM), ENG 1 fuse (20-amp) located in instrument panel fuse block supplies voltage to coil side of auxiliary cooling fan relay with ignition switch in ON position. A ground path for cooling fan relay is supplied by A/C high pressure switch, or auxiliary fan control switch (if equipped). On models equipped with VCM, a ground path for fan control relay is supplied by VCM. As a result, relay contacts close, allowing current to flow to cooling fan motor through relay, resulting in auxiliary cooling fan motor operation.

NOTE: A fully charged A/C system is required for proper auxiliary cooling fan operation.

Cooling Fan Circuit Diagnosis

1. If cooling fan does not operate, or does not operate properly, go to next step. If cooling fan runs continuously with ignition off, go to step 12). If cooling fan runs continuously with ignition on, go to step 13).
2. If cooling fan motor never operates, go to next step. If cooling fan motor does not operate with high coolant temperature, go to step 9). If cooling fan motor does not operate with A/C on, go to step 10).
3. Turn ignition off. Disconnect fan control relay harness connector. Turn ignition on. Using a test light connected to ground, probe fan control relay harness connector terminal No. 30. If test light illuminates, go to next step. If test light does not illuminate, locate and repair open in Red wire between fan control relay and splice near fusible link.

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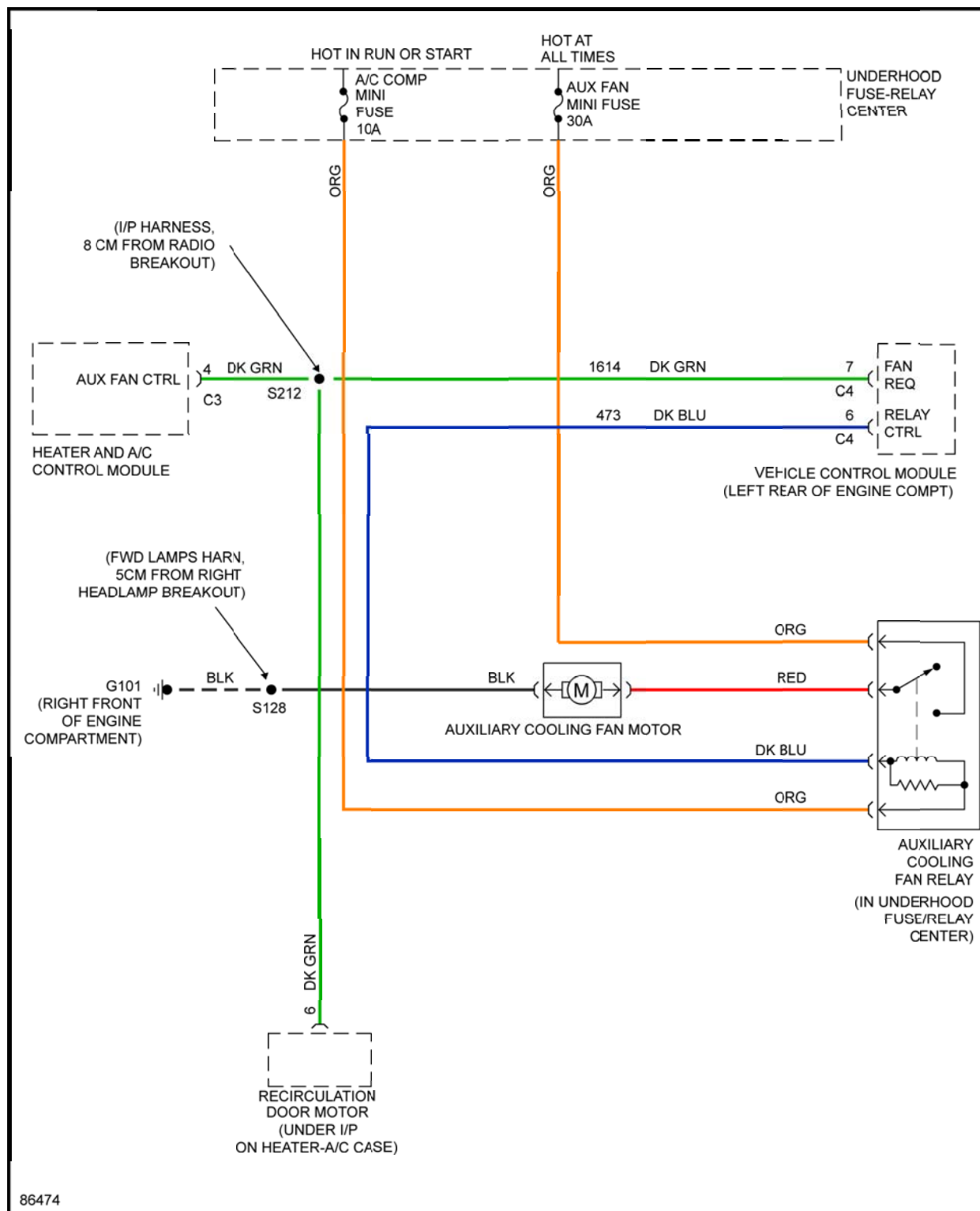
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4. Using a fused jumper wire, jumper fan control relay harness connector terminals No. 30 and 87 together. If cooling fan motor runs, go to next step. If cooling fan motor does not run, go to step 6).
5. Disconnect jumper wire. Using a test light connected to ground, probe fan control relay harness connector terminal No. 85. If test light illuminates, go to step 8). If test light does not illuminate, locate and repair open in Pink wire between ENG 1 fuse and fan control relay.
6. With jumper wire still in place, disconnect cooling fan motor harness connector. Using a test light connected to ground, probe cooling fan motor harness connector terminal "B". If test light illuminates, go to next step. If test light does not illuminate, locate and repair open in Red wire between fan control relay and cooling fan motor.
7. Using a test light connected to battery positive, probe cooling fan motor harness connector terminal "A". If test light illuminates, replace cooling fan motor. If test light does not illuminate, locate and repair open in Black wire between cooling fan motor and ground.
8. Reconnect fan control relay. Using a voltmeter, check voltage (backprobe) between fan control relay harness connector terminal No. 86 and ground. If reading is less than 10 volts, replace fan control relay. If reading is 10 volts or greater, locate and repair open in Dark Green wire between fan control relay and splice.
9. Disconnect auxiliary fan control switch harness connector. Turn ignition on. Using a voltmeter, check voltage between auxiliary fan control switch harness connector terminal "A" and ground. If reading is less than 10 volts, locate and repair open in Dark Green wire between auxiliary fan control switch and splice. If reading is 10 volts or greater, replace auxiliary fan control switch.
10. Disconnect A/C high pressure switch harness connector. Using a voltmeter, check voltage between auxiliary fan control switch harness connector terminal "B" and ground. If reading is 10 volts or greater, go to next step. If reading is less than 10 volts, locate and repair open in Dark Green wire between A/C high pressure fan switch and splice.
11. Using a test light connected to battery positive, probe A/C high pressure switch harness connector terminal "A". If test light illuminates, replace A/C high pressure fan switch. If test light does not illuminate, locate and repair open in Black wire between A/C high pressure switch harness connector terminal "A" and splice.
12. With ignition on, disconnect fan control relay harness connector. If cooling fan motor stops, replace fan control relay. If cooling fan motor continues to run, locate and repair short to power in Red wire between fan control relay and cooling fan motor.
13. Turn ignition off. Disconnect fan control relay harness connector. Using a test light connected to battery positive, probe cooling fan relay harness connector terminal No. 86. If test light illuminates, go to next step. If test light does not illuminate, replace fan control relay.
14. With test light still connected, disconnect auxiliary fan control switch harness connector. If test light remains on, go to next step. If test light does not remain on, replace auxiliary fan control switch.
15. With test light still connected, disconnect A/C high pressure fan switch harness connector. If test light remains on, locate and repair short to ground in Dark Green wire between fan control relay and either A/C high pressure fan switch or auxiliary fan control switch.

WIRING DIAGRAMS

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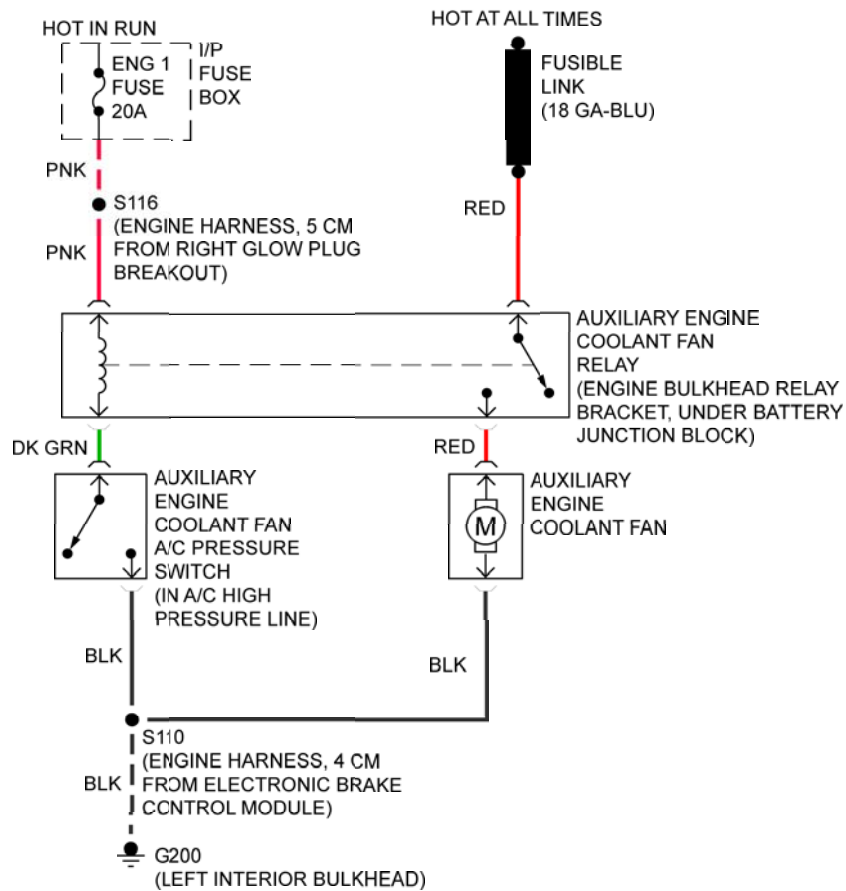


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Fig. 2: Cooling Fan System Wiring Diagram ("C" & "K" Series)

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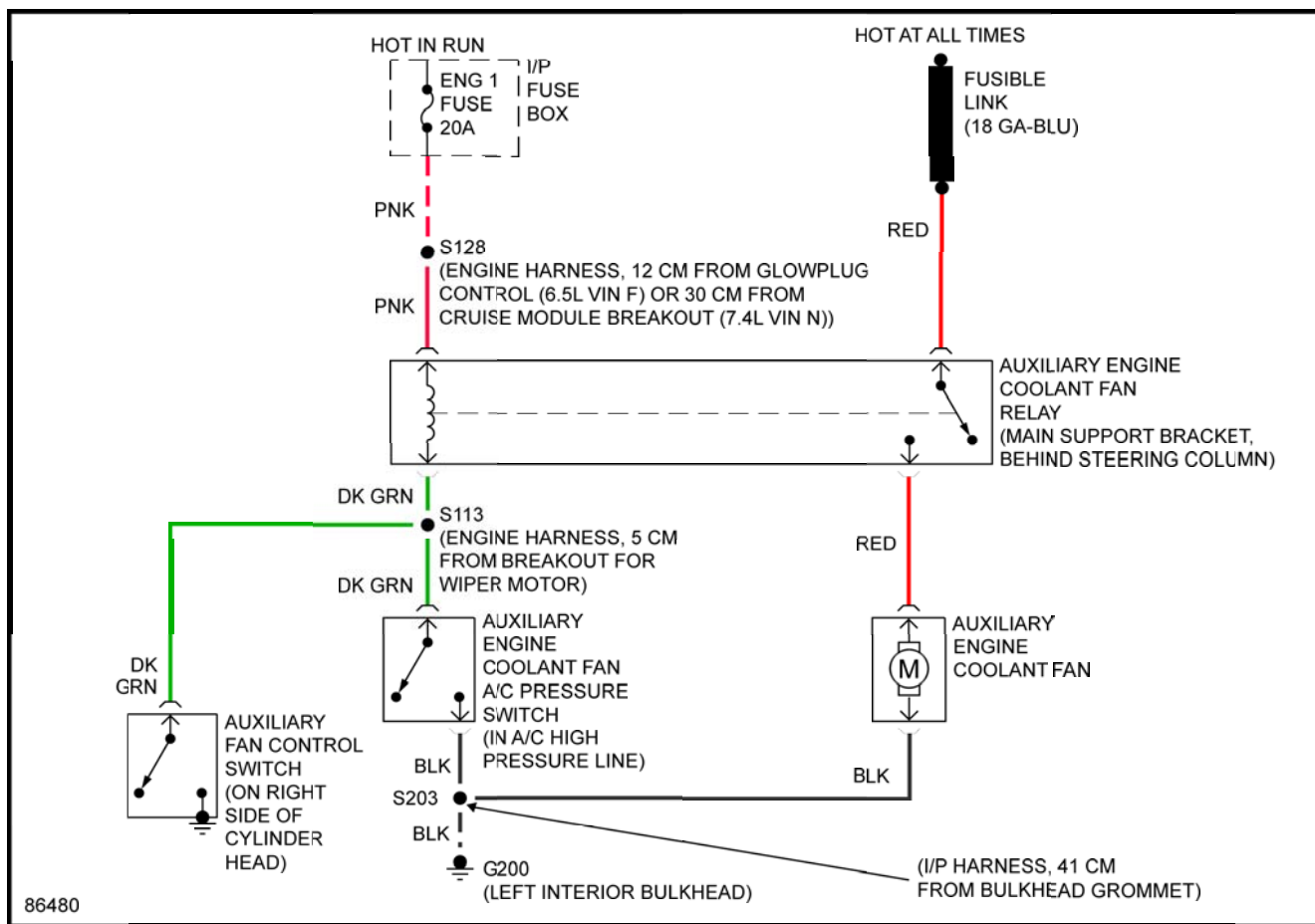
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Fig. 3: Cooling Fan System Wiring Diagram ("P" Series - 6.5L VIN Y Diesel Engine)

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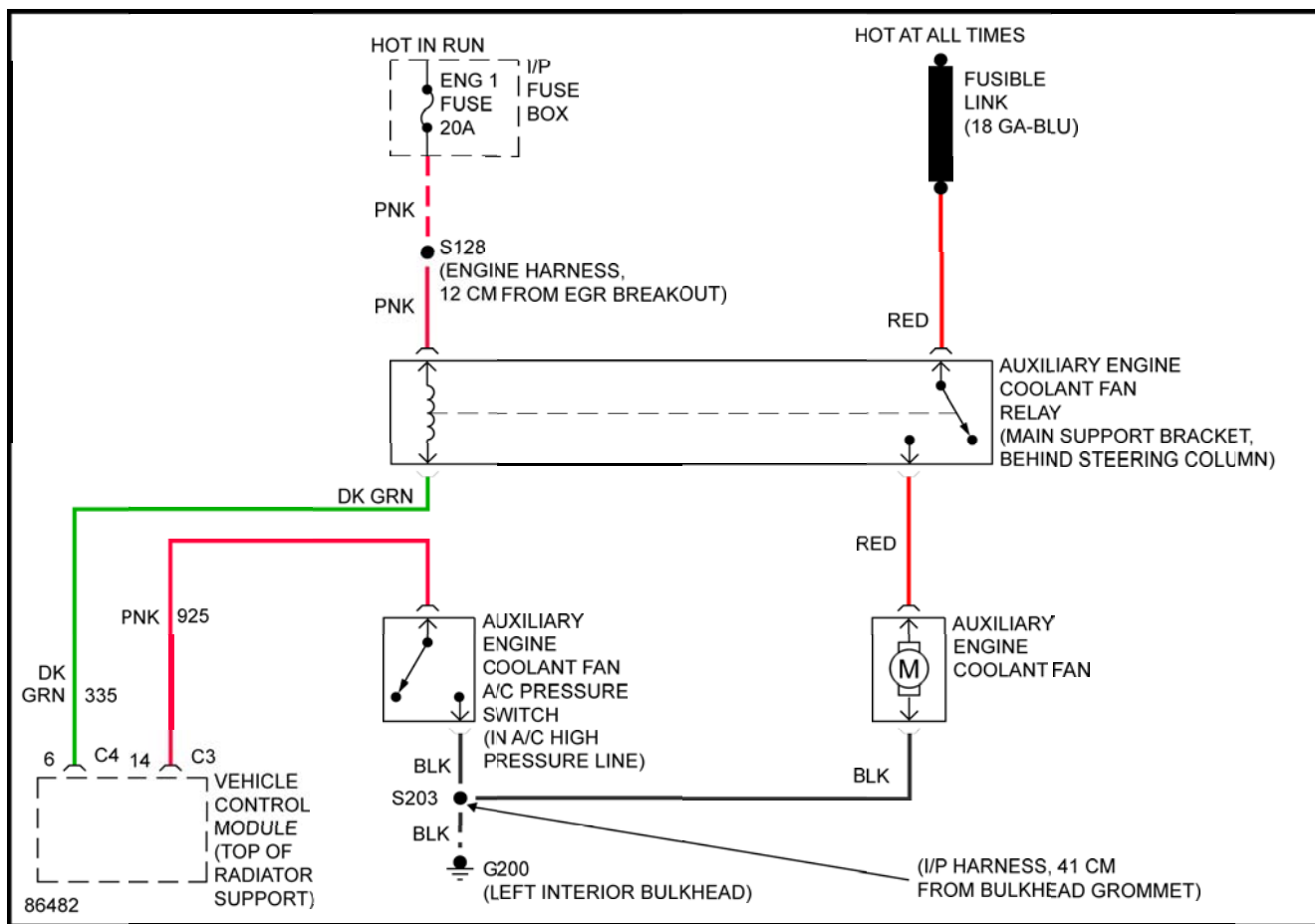


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Fig. 4: Cooling Fan System Wiring Diagram ("P" Series 6.5L VIN F Diesel Engine - & 7.4L VIN N Engine)

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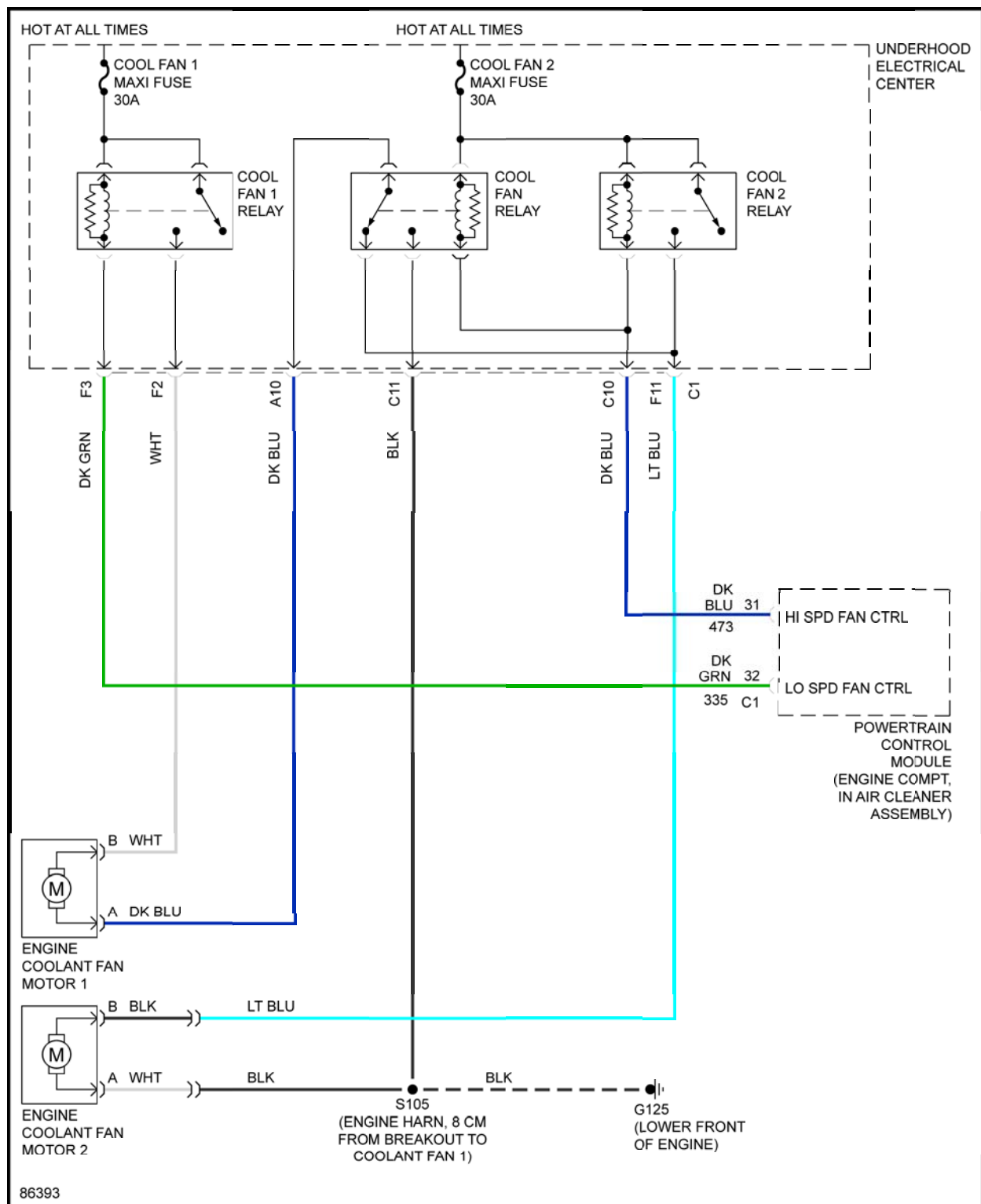


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Fig. 5: Cooling Fan System Wiring Diagram ("P" Series - 7.4L VIN J Engine)

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Fig. 6: Cooling Fan System Wiring Diagram ("U" Series)